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**Citation for published version:**

Eborall, H, Wobi, F, Ellis, K, Willars, J, Abubakar, I, Griffiths, C & Pareek, M 2020, 'Integrated screening of migrants for multiple infectious diseases: qualitative study of a city-wide programme', *EClinicalMedicine*, vol. 21, 100315, pp. 1-7. <https://doi.org/10.1016/j.eclinm.2020.100315>

**Digital Object Identifier (DOI):**

[10.1016/j.eclinm.2020.100315](https://doi.org/10.1016/j.eclinm.2020.100315)

**Link:**

[Link to publication record in Edinburgh Research Explorer](#)

**Document Version:**

Publisher's PDF, also known as Version of record

**Published In:**

EClinicalMedicine

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# Integrated screening of migrants for multiple infectious diseases: Qualitative study of a city-wide programme

Helen Eborall<sup>a</sup>, Fatimah Wobi<sup>a,b</sup>, Kate Ellis<sup>c</sup>, Janet Willars<sup>a</sup>, Ibrahim Abubakar<sup>d</sup>, Chris Griffiths<sup>e</sup>, Manish Pareek<sup>b,c,\*</sup>

<sup>a</sup> Department of Health Sciences, University of Leicester, United Kingdom

<sup>b</sup> Department of Respiratory Sciences, University of Leicester, United Kingdom

<sup>c</sup> Department of Infection and HIV Medicine, University Hospitals Leicester NHS Trust, United Kingdom

<sup>d</sup> Institute of Global Health, University College London, London, United Kingdom

<sup>e</sup> Institute of Population Health Sciences, Barts and The London School of Medicine and Dentistry, Queen Mary University of London, London, United Kingdom

## ARTICLE INFO

### Article History:

Received 3 January 2020

Revised 4 February 2020

Accepted 27 February 2020

Available online 18 April 2020

### Keywords:

Migrants  
Tuberculosis  
HIV  
Hepatitis B  
Hepatitis C  
Screening  
Primary care

## ABSTRACT

**Background:** Migrants from certain regions are at increased risk of key infectious diseases (including HIV, tuberculosis (TB), hepatitis B and hepatitis C). Although guidelines increasingly recommend integrated screening for multiple infections to reduce morbidity little is known about what migrants and healthcare professionals think about this approach.

**Methods:** Prospective qualitative study in Leicester, United Kingdom within a novel city-wide integrated screening programme in three iterative phases to understand views about infections and integrated screening. Phase 1 focus groups (nine) with migrants from diverse communities ( $n = 74$ ); phase 2 semi-structured interviews with healthcare professionals involved in the screening pathway ( $n = 32$ ); phase 3 semi-structured interviews ( $n = 23$ ) with individuals having tested positive for one/more infections through the programme. Analysis was informed by the constant comparative process and iterative across phases 1–3.

**Findings:** Migrants' awareness of TB, HIV and hepatitis B/C varied, with greater awareness of TB and HIV than hepatitis B/C; perceived susceptibility to the infections was low. The integrated screening programme was well-received by migrants and professionals; concerns were limited to data-sharing. As anticipated, given the target group, language was cited as a challenge but mitigated by various interpretation strategies.

**Interpretation:** This large qualitative analysis is the first to confirm that integrated screening for key infectious diseases is feasible, positively viewed by, and acceptable to, migrants and healthcare professionals. These findings support recent guideline recommendations and therefore have important implications for policy-makers and clinicians as programmes of this type are more widely implemented in diverse settings.

**Funding:** National Institute for Health Research.

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## 1. Introduction

Migration is an important determinant of population change with increasing numbers of migrants arriving in Europe [1]; in 2017 over 4 million migrants arrived in the European Union (EU) with half born in non-EU countries [1]. UK statistics indicate that between 1991 and 2011, just over 150,000 migrants arrived in the UK annually with 57.5% of migrants arriving from outside the EU (31.7% from Africa and the Indian subcontinent) [2]. Estimates indicate that 12.4% of the UK population are born overseas; over half of these individuals originate from countries outside the UK and North

America [3]. Urban UK centres have higher levels of migration and therefore larger overseas-born populations. For example, in Leicester, approximately 30% of the population is born outside Europe and North America, and individuals from the Indian subcontinent make up 15% of the population making it one of the most diverse cities in the UK [4].

Whilst migrants are a heterogeneous group [5,6], certain overseas-born individuals (particularly those from Africa and Asia) are at an increased risk of, and disproportionately affected by, communicable diseases - including tuberculosis (TB), HIV, hepatitis B and hepatitis C [5,7]. For example, overseas-born migrants account for over 70% of UK TB notifications and have a 14-fold higher TB incidence than UK-born individuals [8]. People born in Sub-Saharan Africa and Southeast Asia are also at increased risk from blood-borne viruses

\* Corresponding author at: Department of Respiratory Sciences, University of Leicester, United Kingdom.

E-mail address: [mp426@le.ac.uk](mailto:mp426@le.ac.uk) (M. Pareek).

## Research in context

### *Evidence before this study*

Migrants from certain regions are at increased risk of key infectious diseases (including HIV, tuberculosis (TB), hepatitis B and hepatitis C). Early identification of these key infections can reduce morbidity and mortality. Individual disease screening programmes have been implemented and shown to be acceptable to migrants but there is limited data available on what migrants and healthcare professionals think about integrated/combined infection screening programmes for multiple infections.

### *Added value of this study*

Within the context of an ongoing migrant screening programme this large qualitative study confirms that integrated screening for multiple key infections is feasible, positively viewed by, and acceptable to, migrants and healthcare professionals.

### *Implications of all the available evidence*

Migrant screening programmes have historically been focused on identifying individual infections. However this study has shown that developing and delivering migrant screening programmes which provide integrated screening for multiple key infections is highly acceptable. These findings, therefore, support recent guideline recommendations and have important implications for policy-makers and clinicians as programmes of this type are more widely implemented in diverse settings.

## 2. Methods

### 2.1. Ethics

This study received NHS Ethics and Health Research Authority approval from East Midlands - Leicester South Research Ethics Committee (16/EM/0159). All participants gave written informed consent prior to any study procedures.

#### 2.1.1. Study setting and Leicester integrated migrant screening programme

This study was conducted in Leicester, UK which is one of the most ethnically diverse cities in the UK where an integrated migrant screening programme for infectious diseases has been implemented.

The protocol for the Leicester integrated screening programme has been described in detail previously [21]. Briefly, as part of routine care, the national TB screening programme was modified so that new migrants registering in primary-care who meet the eligibility criteria for the programme (arrived in the UK within the last 5 years from a country with TB incidence  $\geq 150/100\ 000$  or from sub-Saharan Africa or are a refugee/asylum seeker) are offered integrated screening for latent TB infection, HIV, hepatitis B and hepatitis C as part of a new patient health-check. Individuals identified to have one/more of the infections are referred to secondary-care infectious diseases specialists for further assessment and management.

### 2.2. Study design

This qualitative study involved three iterative, linked phases. Findings from phase 1 (focus groups with members of migrant communities) informed the subsequent phases. Findings from phases 2 and 3 (qualitative interviews with healthcare professionals and participants who had experienced the screening and subsequent treatment programme) overlapped and mutually informed the direction of later stages of data collection and analysis in both phases.

### 2.3. Participants and recruitment

**Phase 1:** Focus group participants were individuals from a range of migrant communities, typical to Leicester's diverse population. We liaised with local healthcare, third sector and educational organisations to purposively recruit groups of participants whose country of origin matched eligibility criteria for the screening programme. Notably, this included individuals who had attended or declined screening, and others who had not been invited to the screening programme (such as those who been in the UK for longer than 5 years) in order to reach a wider sample within the target community groups. We also worked with these organisations to purposively sample for diversity in terms of country of origin, gender and age whilst ensuring that participants would be representative of Leicester's migrant population. Focus groups took place in community-based settings, including third sector organisations that work with, and provide services for, migrants as well as educational settings (providers of English for Speakers of Other Languages (ESOL) courses, which attract many migrants).

**Phase 2:** Healthcare professional participants were individuals working in healthcare - directly or indirectly involved in developing or delivering the migrant screening and treatment pathway. We purposively sampled to reach a range in terms of professional role and type of involvement with screening pathway. Recruitment of healthcare professionals was via direct invitation, with an accompanying participant information leaflet, opt-in reply slip (to indicate willingness to be contacted about the study) with pre-paid postage. Interviews with healthcare professionals were conducted by telephone or in interviewees' workplace (locations within primary care practices, Leicester City

and account for significant proportions of newly diagnosed cases of HIV and viral hepatitis [9,10].

Data on the outcomes from these communicable diseases suggest that migrants are more likely to have adverse outcomes, including late presentation to care [10,11], and more aggressive disease processes [10–13]; this therefore underscores the importance of early diagnosis and management of communicable diseases in preventing morbidity, mortality and onward transmission [14]. This position is supported by several guidelines from the National Institute for Health and Care Excellence (NICE) and other national/international bodies which advocate screening for key infections [7] including active and latent TB [15], HIV [16], hepatitis B and hepatitis C [17,18].

To date, clinical services (and associated research) have therefore focused on identifying *individual* infections in migrants. Previous work on these individual disease screening programmes has highlighted that migrants are positive about screening for latent TB and viral hepatitis [19,20] but knowledge about key infections (including HIV) is highly variable and may impact on screening uptake.

In response to the need for streamlining diagnostic pathways, guidelines are increasingly advocating moving from individual disease screening to an integrated/combined infection screening approach for multiple key infectious diseases where further assessment and treatment is accessible, affordable and acceptable [7]. However, data supporting this programmatic approach is lacking perhaps reflecting concerns about implementation and resource implications. Moreover, there is no data on what migrants and healthcare professionals think about such an integrated screening approach. This is critically important information for clinicians and policy-makers developing and delivering migrant screening programmes.

In order to investigate this further we implemented a novel primary-care based programme of integrated migrant screening for latent TB, HIV, hepatitis B and hepatitis C in Leicester, UK [21]. Within the context of this integrated programme, we aimed to explore migrants' and healthcare workers' views, concerns, needs and experiences of an integrated infectious diseases screening programme.

Clinical Commissioning Group (CCG), University Hospitals of Leicester (UHL) NHS Trust or Leicester City Council Public Health).

**Phase 3:** Interviews of participants who had been through the screening programme. We purposively sampled individuals from migrant communities who were eligible for, and had been through, the Leicester integrated infectious diseases screening/treatment programme who were typical of Leicester's foreign-born population (inclusion criteria were: age  $\geq 16$  years; arrival in the UK  $\leq 5$  years; overseas-born; country of birth TB incidence  $\geq 150/100\ 000$  or sub-Saharan Africa or Refugee/Asylum seeker. Migrants were recruited from specialist infectious diseases clinics at University Hospitals Leicester (UHL) NHS Trust. Individuals who met the inclusion criteria were provided with verbal and written information about the study (aided, if needed, by a member of staff who could translate). Individuals were given time to consider participation and the opportunity to ask questions before the research assistant double-checked inclusion and exclusion criteria and willingness to participate. Notably, the interviewer did not know which disease/s they had tested positive for; the interviewee could control how much to disclose. Interviews took place in private research offices close to the Department of Infection and HIV Medicine clinic at UHL Trust. Interviews were mainly held in English except for one interview which took place with an interpreter.

#### 2.4. Study procedure, data collection, and management of data

Phase 1 Focus groups took place between November 2016 and February 2017; they were moderated by trained qualitative researchers (JW assisted by KE/PU/MP), staff from the organisations and translators (when needed). A flexible topic guide was used (see supplementary information), which focused on awareness and experiences of (any) health screening checks; (hypothetical) views about attending the combined diseases screening programme; and awareness of the four infectious diseases. Prior to the focus groups starting, researchers took written informed consent, after taking time to explain the study in full (aided by the key individuals and/or translators). Focus groups lasted, generally, for 60 min.

Phase 2 interviews (healthcare professionals) were conducted by trained qualitative researchers (KE/FW) between January and July 2018. Phase 3 interviews (migrants who had been through (or were going through) the screening and treatment pathway) were conducted by trained qualitative researchers (KE/FW) between May 2017 and March 2018. Interviews were generally held in English with interpreters if required and lasted for between 30 and 60 min. The researcher took written informed consent immediately prior to all interviews starting. Interviews were semi-structured and guided by a flexible topic guide (see supplementary information) focusing on views and experiences of the screening and treatment programme, including feasibility issues. With participants' consent, all focus groups and interviews were audio-recorded and fully transcribed.

#### 2.5. Data analysis

Analysis was informed by the constant comparative process [22] and iterative across phases 1–3. Early Phase 1 transcripts were read and discussed in analysis meetings (HE, JW, KE, MP, FW) to identify preliminary themes and areas of interest to explore in greater depth in subsequent focus groups. At the end of phase 1, themes and patterns in the data were translated into an initial coding framework (FW, HE); transcripts were coded (FW) with the framework (facilitated by QSR NVivo qualitative data-indexing software), which was refined throughout the process. Findings from phase 1 influenced the topic guides for phases 2 and 3. Phase 2 and 3 transcripts were read and re-read (FW, HE), coded (FW) with the coding framework refined regularly with new and amended themes. To ensure rigour and integrity of analysis, HE reviewed the coding, and data summaries were

discussed in team meetings. Later in the process, charting (FW, HE) was used to identify patterns [23,24].

When presenting the data, we refer to participants from migrant communities as 'participants' in general, and at times distinguish between 'interviewees' and 'focus group participants,' and healthcare professional participants as 'professionals'. We label data extracts with a study ID number and for professionals we add a little information about job role or department; overall we limit participant details to ensure anonymity.

#### 2.6. Statistical analysis

We computed descriptive statistics for this study. Demographic characteristics of the participants were summarised using median and interquartile range (IQR) (for continuous variables) and proportions/percentages (categorical variables).

### 3. Role of funding

MP is supported by the [National Institute for Health Research](#) (NIHR Post-Doctoral Fellowship, Dr Manish Pareek, PDF-2015-08-102). The views expressed in this publication are those of the author (s) and not necessarily those of the NHS, the National Institute for Health Research or the Department of Health. Gilead Sciences provided an unrestricted grant to fund the cost of the blood-borne virus tests but had no other involvement in the study. The funders had no involvement in the analyses, writing of the manuscript or the decision to submit for publication.

### 4. Results

#### 4.1. Final sample

Overall we recruited 131 participants; one was deemed illegible and thus withdrawn from the focus group before it started and one withdrew themselves prior to their interview. This resulted in 129 study participants (see [Tables 1a](#) and [1b](#)).

In phase 1, nine focus groups were conducted (total  $N = 74$ ), with participants who had been born in: Afghanistan, Bangladesh, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Ghana, India, Iraq, Ivory Coast, Nigeria, Pakistan, Somalia and Sudan.

Our final phase 2 sample included 32 professionals from secondary care ( $N = 19$ ), primary care ( $N = 9$ ), public health ( $N = 2$ ) and Clinical Commissioning (primary care) ( $N = 2$ ). Within this, there were consultants and junior doctors in infectious diseases/respiratory medicine ( $N = 10$ ), nurses, including specialists in TB, HIV and inclusion health ( $N = 8$ ), healthcare assistants and specialist support workers ( $N = 4$ ), general practitioners ( $N = 5$ ), managerial roles ( $N = 4$ ) and a medical laboratory scientist ( $N = 1$ ).

**Table 1a**

Demographic characteristics of the focus group participants and those migrants who were interviewed having undergone screening.

Demographic variable	Focus group participants ( $n = 74$ )	Individuals interviewed having undergone screening ( $n = 23$ )
<i>Gender</i>		
Male	29 (39.1%)	12 (52.2%)
Female	45 (60.9%)	11 (47.8%)
Age, median (IQR)	33 (29–39)	30 (24–34)
<i>World Bank region of birth</i>		
South Asia	30 (40.5%)	16 (69.6%)
Sub-Saharan Africa	43 (58.1%)	7 (30.4%)
Middle East and North Africa	1 (1.4%)	0 (0.0%)
English speaking	61/74 (82.4%)	22/23 (95.6%)

**Table 1b**

Demographic characteristics and job roles of the healthcare professionals interviewed in the study.

Demographic variable	Healthcare professionals (n = 32)
<i>Gender</i>	
Male	16 (50%)
Female	16 (50%)
<i>Setting of work</i>	
Primary care	9 (28.1%)
Secondary care	19 (59.4%)
Public Health	2 (6.3%)
Clinical Commissioning Group	2 (6.3%)
<i>Job role</i>	
Infectious Diseases/Respiratory/Hepatology specialists	10 (31.3%)
Specialist nurses	8 (25%)
Healthcare assistant and specialist support workers	4 (12.5%)
Primary care physicians	5 (15.6%)
Healthcare manager	4 (12.5%)
Laboratory scientist	1 (3.1%)

The final phase 3 sample included individuals ( $N = 23$ ) were born in Afghanistan, Bangladesh, Cameroon, Eritrea, India, Nigeria, Pakistan, Somalia and Zimbabwe.

#### 4.2. Awareness of infectious diseases and perceived risk

When asked about knowledge of the diseases prior to screening, over half of interviewees reported awareness of TB and HIV, mentioning sources such as campaigns in their country of origin and a few cases of relatives having TB. In general awareness of these conditions was lower in some of the focus groups. Migrants' knowledge of hepatitis B and C was very low across the sample.

"I never heard about hepatitis B in my life. I know about TB, but hepatitis B I was like not aware of." (Int. 018)

"I know TB but I didn't know hepatitis [...] HIV I know because [in] India we have some campaigns [...] and for TB also they are doing some campaigns..." (Int. 020)

"...TB, HIV, and hepatitis B and C, some of the people don't understand actually [...] there's a lack of knowledge, actually we don't know [...] what the disease [is] going to be and how can I like prevent them [FG 009]

In terms of perceived risk, not one participant reported expecting to test positive for HIV or hepatitis, and just three had considered themselves possible candidates for TB due to past circumstances. Low perceived risk was rooted in beliefs about candidacy (e.g. poor immune systems), transmission (e.g. crowded living conditions for TB and sexual behaviours for HIV) or having tested negative at previous screening (e.g. airport TB screening). Hence, those who tested positive for one of the disease typically described being shocked.

"I was told I had latent TB. I was surprised, because before coming to the country, I've already [had tests] done back home [and] they've not shown anything." (Int. 011)

"I was like, I am healthy, I am fine, so it might be something regarding vitamins [...] and all of a sudden when I heard it is TB, I got a bit lost [...] I got a bit shocked." (Int. 027)

#### 4.3. Views and experiences of combined infection screening

Participants often mentioned accepting and experiencing the tests as part of a new patient general health check. The majority of these

spoke positively about the opportunity of being offered the tests routinely, citing benefits of prevention, particularly for asymptomatic conditions, and/or that it was cost-free. In addition participants highlighted the benefits of the combined programme testing for, and potentially identifying, multiple infections at one time-point.

"Yeah, specifically, to register me for NHS [...] and she took some blood tests [...] it was for all of that, like TB, HIV and hepatitis and everything." (Int. 019)

"The screening [is] for Asians, Africans and people coming from different selected countries [...] It's good it's free. But then if they don't turn up, how will they know it? Better safe than sorry [...] it's like when they come, do their full blood test at the very beginning. You don't have to wait for someone to have some problems, start coughing or start sneezing." (Int. 012)

A couple of focus group participants (who had not necessarily been invited for screening) voiced reluctant to attend any testing and/or engage with primary care:

"I'm scared to go to the GP, because I have got flatmates, they're going many times, and they're taking a lot of bloods, but there's no result. If there's not a result, just taking the blood, why should I go to the doctors?" ... [FG 002]

However, other participants, who recalled confusion about the purpose of the testing and the reason for their invitation, later acknowledged the benefits.

"[Participant] said he's new in the city [...] he had a lot of [confusion], [he] came from Africa, so he didn't know exactly why they are doing this. He was not happy as such, but he thought it's better to have this opportunity to know if I have any problem" (translating for focus group participant FG 001)

Professionals in the infectious diseases clinic were mindful of the range of awareness and preparedness of patients attending, and the likely associated reactions and emotions expressed.

"Some people will come with quite a good understanding of the tests that have been done and they'll be familiar with their results [...] and they'll have a clear idea of why they've come to see me and what we're going to discuss. Probably about a 50/50 split [...] The other half will come and really not understand at all." (H002, TB service)

Professionals from across the pathway typically described the combined screening approach as positive and efficient, mentioning the benefits of early detection and treatment for the individual patient and the population, with many predicting it to be cost-efficient. Health professionals also cited the streamlining of services and moving away from working in disease/infection silos and towards an integrated programme.

"It's kind of fabulous approach in preventative medicine, rather than waiting for them to have TB, waiting for them to have hepatitis B, with its complications. Anticipate the right group of population, pick them, screen them, follow them before they come sick" ... (H029, ID clinic)

"I think that's absolutely brilliant, because that means patient hasn't got to come to practice again and again. [...] it's saving time to healthcare professionals as well as patients. So having this kind of programme in place where you're screening for more than one condition definitely is good. I mean obviously you're only taking one set of blood as well, at the same time..." (H001, Clinical Commissioning)



#### 4.4. Targeted screening and potential stigmatisation

Some healthcare professionals voiced concern about perceived victimisation and stigmatisation, if the programme was seen as directly targeting particular groups due to assumptions made about their country or origin and associated behaviours or lifestyles with negative connotations

"You could feel like insinuations were being made about your life-style couldn't you, which could feel very uncomfortable, it could actually be quite upsetting." (H027, Public Health)

"There's huge issues around stigma... how would you feel, you're resettling, you're trying to get into a new community and we say, 'oh, actually, if you come from here, you're fine; if you come from there, we need to screen you'?" (H016, Public Health)

Notably, with the exception of a nurse who reported occasional patients saying they felt "a bit picked on" such concerns were voiced by professionals that are in non-patient-facing roles. Indeed, those with patient contact emphasised the importance of talking about IDs without apprehension in order to minimise (rather than exacerbate) any stigmatisation associated with the conditions and/or testing:

"I think if you tiptoe around something, then the patient themselves feel that disease has to be tiptoed around and [...] you can actually make something more secretive and more stigmatised than it was in the first place." (H023, TB service)

Indeed, for the participants, it was less a sense of stigmatisation from being targeted for disease screening, but more an unease about how the data collected would be stored and used. For example, some feared implications for immigration and/or asylum applications if tested positive of one or more conditions.

"Most of [fellow focus group participants] are not here as British citizen, they didn't come British citizen. Their fear is what [will] happen to my [visa/citizenship] case if I've got these diseases, they might be rejecting me from the country, they might close my case" (FG 007)

Several professionals discussed anticipation of such concerns and their keenness to allay new migrants' fears by developing a good relationship with them and conveying the benefits of treatment.

"I think just the most important thing is to sort of let the migrant understand that [...] if they're found to be positive then it's something that we can treat and they're not going to be sent out of England or not allowed to work. And I think that's- it's building up trust, a lot of it is trust." (H003, TB service)

#### 4.5. Receiving test results and treatment

Most participants who had experienced the screening and treatment described, or indicated, an overall positive experience of the programme. Participants highlighted instances in clinic when professionals had taken time to explain the disease diagnosed, its transmission and treatment/monitoring regime(s), which gave participants reassurance and/or a sense of feeling fully informed and reduced anxiety.

"I'm shocked [...] I'm searching Internet, what happened? Still confused. Then after [the doctor explained] my tension is gone away and I think because he told me like that, in three months you will be alright." (Int. 010)

"He's giving me the tablet[s] step by step. First previously he had not given me the TB one, he had just started for me the hepatitis B

medicine, because the units have to be decreased. So once it gets decreased then he's going to start me a TB medicine" (Int. 018)

Some professionals interviewed had specific roles relating to following-up and checking patient understanding, acknowledging the benefit of this dedicated time. Indeed, participants mentioned reassurance from follow-up care provided.

"[The nurse] came to my house, one, two times. To check me, how I am [...] when I'm starting my medicine. After she come to me like one week and two days. [...] she checked my medicines, my timetable." (Int. 010)

A few participants recalled being anxious, following initial testing in primary care; for a couple this was due to their uncertainty about when and how they would receive their results. In one case, friends with more familiarity with the healthcare system explained:

"...after the test, he was a bit worried, but he asked one of his friends. They [said], 'After doing the test, if there's anything wrong then you'll get a letter. So if you haven't received anything then you're OK.'" (translating for focus group participant FG 001)

For a few others, the wait between testing positive and awaiting treatment was the most worrying point. A potential source of confusion in the early stages related to the terms 'positive' and 'negative' regarding test results.

"If it's positive [it] means everything's fine,...no, sorry, if negative, everything is fine, I think."

(Moderator: But that's interesting that you said that. I mean did, is that, was your thoughts before you came here that if it was negative that meant you had HIV?)

"negative is positive. Yeah, sometimes I become confused." (FG 009)

Both participants and professionals mentioned language as a key challenge in ensuring full understanding, particularly given the number of different languages spoken by patients. Strategies for addressing this included employing multilingual cultural link workers, accessing interpreters and some healthcare professionals spoke in a patient's language.

"There is such a wide variety of nationalities and languages and many of our patients don't speak English particularly well. We do have some people in the TB service that speak foreign languages, like mainly Indian languages, but they don't speak some of the African languages and we have to use [telephone interpreting service] which isn't always ideal." (H018, ID clinic)

Professionals acknowledged that access to such services was more difficult for primary care, leading to challenges at the time of the initial test, although this could be addressed for those testing positive once in clinic.

"Sometimes GPs might, you know, write and say it was difficult having a conversation with them because of language barriers and so [we] end up having to have a lot more detailed conversation with some of them." (H013, ID clinic)

## 5. Discussion

We undertook a large qualitative study within an ongoing integrated infectious diseases migrant screening programme in the UK [21] to understand, for the first time, the views of migrants and

healthcare professionals to combining screening for multiple key infectious diseases including latent TB, HIV, hepatitis B and hepatitis C. Our rigorous analysis has highlighted elements relating to acceptability of screening interventions thereby providing information for clinicians and policy-makers developing public health programmes for migrants.

We found that both migrants and healthcare professionals had positive views about the integrated screening programme. Staff and migrant participants mentioned the benefits of early prevention and treatment; staff commended its efficiency; and participants appreciated the care received (including time taken to explain diagnosis and treatment) and lack of cost. Our findings are in keeping with previous work on individual disease testing programmes [19,20] but our work extends the evidence base by documenting, for the first time, the positive opinions to integrated/combined infection disease screening for TB, HIV and viral hepatitis thereby providing empirical data to support recent ECDC guidelines which recommend moving from single/individual disease testing to integrated multiple infection screening [7]. This finding is critically important when designing real-world screening programmes which improve access to testing for serious infections in one visit (rather than multiple visits) and also limit attrition through the cascade of care [25].

Concerns about screening triggering stigmatisation of migrants appear to be unfounded; rather, participants raised concern about test results impacting on immigration and/or asylum applications. Professionals who worked closely with those being treated were keen to allay such concerns by building trusting relationships. Importantly, issues relating to stigma around the infectious diseases was not prominent in this cohort. This finding is in keeping with recent research on TB in the UK [26] and may reflect the fact that the study participants were, generally, a younger group who may have had more exposure to disease control programmes/education in their countries of origin prior to migration or that they had more concerns about the fear of implications for immigration/asylum. Additionally, although we did not find religion or cultural taboo as prominent themes influencing screening uptake in our cohort, previous work relating to testing for hepatitis B did find that it did affect screening participation [27,28].

We found that migrants' awareness of the four infectious diseases varied, with greater awareness of TB and HIV, than hepatitis B and C. There was a tendency towards low personal perceived risk, and those who had tested positive for one of the diseases reported being shocked. Previous studies examining individual infections have also demonstrated that migrants have limited awareness of certain infections and typically low perceived susceptibility across all conditions which may adversely impact on screening uptake [29–33]. However, this study adds to the evidence base as participants in our study were asked about all four key infections which allowed us to explore comparative perceptions within one study. The findings indicate a need to raise awareness of all four key infections, including transmission methods, risk factors (relating to country of birth and migration route) and the availability of treatment *prior* to an individual's invitation to testing. Hence, our study adds to calls from prior research for improved public-facing awareness-raising programmes, which acknowledge and address perceptions of target group and local context. Any such awareness campaigns will need to take into account multiple factors including migrants' country of origin, age, gender, language skills and educational attainment [34]. Further, we extend this argument by recommending a method for doing this on a local level: our methodological approach of recruiting and conducting focus groups in liaison with local community organisations, revealed that many new migrants consult these organisations before engaging with healthcare, hence identifying useful – and novel – settings for undertaking awareness raising about infectious diseases and availability of (free) healthcare services.

Participants' experiences highlighted points in the pathway when there may be raised anxiety (e.g., awaiting test results) and/or confusion (whether or not negative results would be communicated as well as positive ones). Finally, the demographics of new migrants invited to this programme mean that language is often an influence on full communication. It is important, therefore, that culturally competent healthcare is the focus of such screening programmes. Although this can include various strategies [35], such as interpreters, visual material and linguistic matching in our programme we found that investing in roles such as a 'multicultural link worker', healthcare professionals having the ability to speak some languages in common with migrant communities and developing resources in some languages have improved communication between migrants and healthcare professionals.

On a practical level, our work has shown that the provision of simple information (in written form or as an online resource) at the outset should include key points about the process for receiving results and who will/will not have access to results. In terms of language, while the pros and cons of strategies for translation are well-documented (for example, use of interpreters [36], providing understandable information for patients in *some* format should remain a priority for services likely to be used by new migrants. A review of the languages spoken by users of a service can guide both the development of documentation and resources, and inform services about useful languages for multicultural link workers to be proficient in.

Migrants are often an underserved and unheard group in research and clinical studies. However, we argue that a particular strength of this study is the size and diversity of the sample as well as the fact that it was representative of the foreign-born population and those screened/treated through the screening programme; it includes individuals born in 16 different countries, 23 of whom were receiving treatment after having tested positive for at least one disease through the programme, and professionals involved at all stages of this novel testing and treatment pathway. One disadvantage of the diversity of country of origin is the difficulty of exploring cultural differences between participants in full (given the small numbers from some countries). Although our cohort was large and covered the testing and treatment pathway, we anticipated that gaining the perspectives of individuals who did not attend the combined testing or an even larger number of individuals who tested negative for the infections in primary care would be challenging ethically and practically. The phase 1 focus groups aimed to address this, by seeking views of a wider sample, and within these groups we were able to better understand any concerns relating to screening for infection – some of whom had already been through the screening programme.

Unsurprisingly, given the target participant group, limited English language restricted the extent to which some participants could express themselves (particularly in the phase 1 focus groups). We sought to mitigate this as much as possible by undertaking focus groups in liaison with third sector and educational organisations, where often interpreters (formal or informal) could assist, but we acknowledge the limitations nonetheless. Our work focused on younger individuals who make up the largest group of migrants arriving in the UK (and Leicester) [37] but future work should also prospectively recruit older migrants and within migrant subgroups in other geographical settings who may have different views and levels of knowledge relating to infection and screening.

In conclusion, we found that an integrated infectious disease screening programme for migrants was feasible and acceptable to members of the target group as well as healthcare professionals involved in the development and delivery of the pathway of care. Our findings support the recommendations made in recent guidelines and have important implications for policy-makers and clinicians as further programmes of this type are developed and implemented in an increasing number of geographical settings.

## Declaration of Competing Interests

MP reports an institutional grant (unrestricted) for project related to blood-borne virus testing from Gilead Sciences outside the submitted work. All other authors report no conflicts of interest.

## Acknowledgments

We thank all of the study participants for giving up their time and sharing their views and experiences. We thank Paul Underwood for assisting with the focus groups in Phase 1. We thank staff from Leicester College Curriculum Area ESOL (particularly Geoff Saul, Rominder Sandhu, Pam Sargeant and Munawara Sattar); and Leicester City CCG – for their assistance in facilitating recruitment and organisation of focus groups and interviews.

## Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:[10.1016/j.eclim.2020.100315](https://doi.org/10.1016/j.eclim.2020.100315).

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